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10/585,390	06/22/2009	Simeon Furrer	CH920030062US1	5937

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EXAMINER	
BEDNASH, JOSEPH A	
ART UNIT	PAPER NUMBER
2461	
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/585,390	FURRER ET AL.	
	Examiner	Art Unit	
	Joey Bednash	2461	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *06 July 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-18* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-18* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *23 March 2009* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

This action is responsive to preliminary amendments filed 06 July 2006. Claims 1-18 are pending in the application. Claims 3, 6-18 are amended.

Drawings

1. Figure 1 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). Corrected drawings in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Objections

1. Claims 1, 2, 4, 6, 9, 11, 12, 14, 16 and 17 objected to because of the following informalities: Applicant has used the symbol * (asterix) to indicate the complex conjugate for a complex number and also in some instances in the subject claims as the symbol for multiplication. In other instances the symbol · (dot) has been used to indicate multiplication. Applicant is respectfully requested to choose one use for each of the

symbols and to use the symbols consistently throughout the claims. Appropriate correction is required.

2. Claim 12 is objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. Claim 9 from which claim 12 depends indicates the IDFT means generates complex output symbols z(n). The inclusion in claim 12 that complex symbols z(n) = x(n) + j*y(n) does not impose any additional meaningful limit on claim 9 from which claim 12 depends.

Claim Rejections - 35 USC § 101

1. 35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

2. Claim 8 is rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter. Claim 8 is directed towards a computer program product which is software per se. Software is non-statutory subject matter, therefore claim 8 is rejected as non-statutory.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 2 and 11 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 2 lacks clarity because the functional steps claimed are performed in claim 1 from which claim 2 depends. Claim 1 includes a limitation of transforming F(k) to Z(k) utilizing the equation of claim 1, while claim 2 includes converting F(k) to Z(k) using the symmetry property of spectra of real sequences. It is unclear how the method is performed because the claim includes converting and transforming F(k) to Z(k). It appears the limitation of converting in claim 2 is a broader description of that which is achieved by the claimed transforming of claim 1 because the specification describes the use of the symmetry property of real sequences in the derivation of the equation of claim 1 **(Publication of instant application US 2009/0323510 A1, Para [0045]-[0052])**. It is also unclear how F(k) relates to X(k), Y(k) and x(n) and y(n).

Claim 11 is directed towards the means for performing the method of claim 2, and contains the same lack of clarity issues.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 1-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fertner et al. (U.S. Patent No. 5,987,005), hereinafter referred to as "Fertner".

Regarding claim 1, Fertner discloses a method for modulating sub-carrier symbols F(k) to an intermediate-frequency OFDM signal (f(n)) having even and odd samples, the method comprising the steps of:

transforming a number N of the sub-carrier symbols F(k) to pre-processed sub-carrier symbols Z(k) according to the function:

$$Z(k) = \frac{1}{2} \cdot \left[F(k) + F(N-k)^*\right] + \frac{1}{2} \cdot j \cdot \left[F(k) - F(N-k)^*\right] \cdot e^{j\pi k/N}$$

with k=0...N-1 **(Fig. 4, Extraction Block & Fig. 5, Preparation Block 46, Col. 8, lines 18-26 indicate the preparation block 46 performs the same function of the Extraction Block 42 of Fig. 4; Col. 7, line 62- Col. 8, line 17 describe the function of the Extraction Block 42; Col 5, Equations 9, 10, 11, 13 and last line of Col. 5)**;

performing a complex inverse discrete Fourier transformation (IDFT) on the pre-processed sub-carrier symbols Z(k) to generate complex output symbols z(n) **(Fig. 5, N-Point FFT 48 and Complex Conjugators 44 and 50; Col. 7, lines 24-39; Col. 4, lines 44-64 and equation (3))**; and

transforming the complex output symbols z(n) to the intermediate-frequency OFDM signal (f(n)), by multiplexing the real and imaginary parts of the complex output symbols z(n) into even and odd samples of the intermediate frequency OFDM signal (f(n)) **(Fig. 5, Complex to Real Expander 52; Col. 7, lines 39-47; Col. 8, lines 43-49)**.

Fertner teaches a method which uses an N-point discrete Fourier Transform (DFT) to calculate the DFT of a 2N-point real valued sequence utilizing the

transformation described by equations 13 which differs slightly from applicant's claimed equation. However, Fertner teaches equation 14 (i.e. the claimed equation) is redundant information and opts to utilize equation 13 to perform the claimed transformation **(Col. 6,lines 1-10)**. It would have been obvious to one of ordinary skill in the art that using equation 14 as the N-point input to the DFT would achieve the same result as that produced by utilizing equation 13 because Fertner teaches the equations are redundant and thus equivalent.

Regarding claim 2, Fertner fairly suggests the method according to claim 1 further comprising the steps of:

assigning the sub-carrier symbols F(k) to a spectrum F(i) with i=0...2N-1 of the intermediate-frequency OFDM signal (f(n)) **(Col. 3, line 58 – Col 4, line11)**, negative frequency contents being derivable from the symmetry property of spectra of real sequences, F(i)=F(2N-i)* **(Col. 6, lines 10-64)**;

converting the sub-carrier symbols F(k) **(i.e. $x_B(k)$)**, with k=0...N-1, to the pre-processed complex sub-carrier symbols Z(k) **(i.e. X(k), equation 14)** using the symmetry property of spectra of real sequences, wherein Z(k)=X(k)+j·Y(k) **($X_C(k)$, equation 5)** with X(k) **($X_1(k)$, equation 9)** and Y(k) **($X_2(k)$, equation 10)** defining the spectra of real sequences x(n) **($x_1(n)$, equation 6)** and y(n) **($x_2(n)$, equation 7) (Col. 5, line 6- Col. 6, line 10; Col. 7, line 62- Col. 8, line 26)**; and

performing the complex inverse discrete Fourier transformation (IDFT) of the pre-processed complex sub-carrier symbols Z(k) into the complex output symbols

z(n)=x(n)+j·y(n) **(equation 4) (Fig. 5, N-Point FFT 48 and Complex Conjugators 44 and 50); Col. 7, lines 24-39; Col. 4, lines 44-64 and equation (3))**.

Note: The limitation "negative frequency contents being derivable from the symmetry property of spectra of real sequences, F(i)=F(2N-i)*" is a statement of intended use or field of use. Such language that suggests or makes optional but does not require steps to be performed or does not limit a claim to a particular structure does not limit the scope of a claim or claim limitation (MPEP 2111.04).

Regarding claim 3, Fertner fairly suggests the method according to claim 1, wherein the complex inverse discrete Fourier transformation (IDFT) is performed as an inverse fast Fourier transformation (IFFT) **(Col. 4, lines 44-64, N-point FFT; Fig. 5, N-Point FFT 48)**.

Regarding claim 4, Fertner teaches a method for demodulating an intermediate-frequency OFDM signal (f(n)) having even and odd samples to post-processed sub-carrier symbols F(k), the method comprising the steps of:

transforming the intermediate-frequency OFDM signal (f(n)) to complex input symbols z(n), by demultiplexing the even and odd samples of the intermediate-frequency OFDM signal (f(n)) onto the real and imaginary parts of the complex input symbols z(n)=x(n)+j*y(n) with x(n)=f(2n) and y(n)=f(2n+l) with n=0...N-l **(Fig. 4, real-to-complex compressor 38; Col. 7, lines 48-54)**;

performing a complex discrete Fourier transformation (DFT) on the complex input symbols z(n) to generate complex DFT output symbols Z(k) **(Fig. 4, N-point FFT 40; Col. 7, lines 58-61; Col. 4, lines 29-31)**; and

transforming the complex DFT output symbols Z(k) to the post-processed sub-carrier symbols F(k) according to the function:

$$F(k) = \frac{1}{2} \cdot \left[Z(k) + Z(N-k)^*\right] - \frac{1}{2} \cdot j \cdot \left[Z(k) - Z(N-k)^*\right] \cdot e^{-j\pi k/N}$$

with k=O...N- 1 **(Fig. 4, Extraction Block 42, ; Col. 7, line 62- Col. 8, line 17 describe the function of the Extraction Block 42; Col 5, Equations 9, 10, 11, 13 and last line of Col. 5)**.

Fertner teaches a method which uses an N-point discrete Fourier Transform (DFT) to calculate the DFT of a 2N-point real valued sequence utilizing the transformation described by equations 13 which differs slightly from applicant's claimed equation. However, Fertner teaches equation 14 (i.e. the claimed equation) is redundant information and opts to utilize equation 13 to perform the claimed transformation **(Col. 6,lines 1-10)**. It would have been obvious to one of ordinary skill in the art that using equation 14 as the N-point input to the DFT would achieve the same result as that produced by utilizing equation 13 because Fertner teaches the equations are redundant and thus equivalent.

Regarding claim 5, Fertner fairly suggests the method according to claim 4, wherein the complex discrete Fourier transformation (DFT) is performed as a fast

Fourier transformation (FFT) **(Fig. 4, N-point FFT 40; Col. 7, lines 58-61; Col. 4, lines 29-31)**.

Regarding claim 6, Fertner fairly suggests the method according to claim 4, further comprising the steps of:

performing the complex discrete Fourier transformation (DFT) of the complex input symbols z(n) into the complex DFT output symbols $Z(k)=X(k)+j\cdot Y(k)$ with k=0...N-1, X(k) and Y(k) being the spectra of the real sequences x(n) and y(n) **(Col. 7, lines 58-61)**;

post-processing of the complex DFT output symbols Z(k) with k=1...N-1 to the post-processed sub-carrier symbols $F(k)= X(k)+e^{-j\pi k/N}\cdot y(k)$ of the intermediate-frequency OFDM signal (f(n)) **(Fig. 9; Col. 10, lines 35-44)**; and

assigning the post-processed sub-carrier symbols F(k) to an order for further processing **(Fig. 9, Symbol Decoder 186 to further processing)**.

Regarding claim 7, Fertner teaches a computer program element comprising program code means for performing the method of claim 1 **(see rejection of claim 1 above)** when said program is run on a computer **(Col. 8, lines 50-63)**.

Regarding claim 8, Fertner discloses a computer program product stored on a computer usable medium, comprising computer readable program means for causing a

computer to perform the method according to claim 1 **(See rejection of claim 1 above; Col. 8, lines 50-63)**.

Regarding claims 9-11, the claims are directed towards the means for performing the method of claims 1, 3 and 2 respectively, and as such are rejected on the same grounds presented fro claims 1, 3 and 2 respectively.

Regarding claim 12, Fertner fairly suggests the orthogonal frequency division multiplex modulator according to claim 9, wherein the IDFT means is adapted to perform the complex inverse discrete Fourier transformation (IDFT) of the pre-processed complex sub- carrier symbols Z(k) into the complex output symbols z(n) = x(n)+j·y(n) **(Fig. 5, N-Point FFT 48 and Complex Conjugators 44 and 50; Col. 7, lines 24-39; Col. 4, lines 44-64 and equation (3))**.

Regarding claim 13, Fertner fairly suggests the orthogonal frequency division multiplex modulator according to claim 9, wherein the first transforming means and the IDFT means are integrated into one device **(Fig. 6; Col. 8, lines 50-63; Col. 9, lines 16-24)**.

Regarding claims 14-17, claim 14 is the means for performing the method of claim 4, claim 15 is the means for performing the method of claim 5 and claims 16 and

17 contain means for performing the method of claim 6, therefore claims 14-17 are rejected on the grounds presented above with respect to claims 4-6.

Regarding claim 18, Fertner fairly suggests the orthogonal frequency division multiplex demodulator according to claim 14, wherein the DFT means and the second transforming means are integrated in one device **(Fig. 6; Col. 8, lines 50-63; Col. 9, lines 16-24)**.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Joey Bednash whose telephone number is (571)270-7500. The examiner can normally be reached on Mon-Fri 7:30 AM to 5:00 PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Huy Vu can be reached on (571)272-3155. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Joey Bednash/
Examiner, Art Unit 2461

/Jason E Mattis/
Primary Examiner, Art Unit 2461